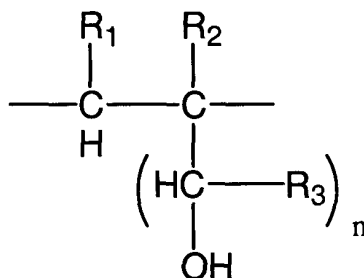


CLAIMS

We claim:

1. A composition comprising:
 - a first component comprising thermoplastic polyurethane;
 - a second component comprising a hydroxyl-functional copolymer; and
 - a third component comprising a gel reducing additive having a molecular weight of less than the molecular weight of the hydroxyl-functional copolymer;

wherein the hydroxyl-functional copolymer comprises a polymer having 10 mole percent or more of repeating units of structure



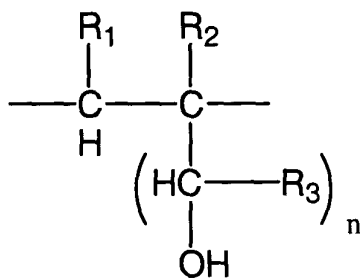
wherein n is 0 or 1, R1 and R2 are independently hydrogen, methyl, or ethyl, and R3 is hydrogen or C₁₋₃ alkyl, and

wherein the gel reducing additive is selected from the group consisting of compounds with at least one hydroxyl group, compounds with at least one primary amino group, compounds with at least one secondary amino group, compounds with at least one carboxyl group, and compounds with at least one carboxylic anhydride group.

2. A composition according to claim 1, wherein the hydroxyl functional copolymer comprises an ethylene vinyl alcohol copolymer.
3. A composition according to claim 1, wherein the gel reducing additive comprises a polyester polyol.

4. A composition according to claim 1, wherein the gel reducing additive comprises a polyether polyol.
5. A composition according to claim 1, wherein the molecular weight of the gel reducing additive is equal to or less than 2000.
6. A composition according to claim 1, wherein the molecular weight of the gel reducing additive is equal to or less than 200.
7. A composition according to claim 1, wherein the gel reducing additive comprises a compound having two or more hydroxyl groups.
8. A composition according to claim 1, wherein the gel reducing additive comprises a compound with two or more amino groups.
9. A thermoplastic sheet, produced by extruding a composition according to claim 1.
10. A thermoplastic sheet, produced by extruding a composition according to claim 2.
11. A method for preparing a sheet comprising a blend of thermoplastic polyurethane and at least one hydroxyl-functional copolymer, comprising the steps of:
 - combining a first component comprising at least one thermoplastic polyurethane, a second component comprising a hydroxyl-functional copolymer, and a third component comprising a gel reducing additive;
 - applying thermal energy, mechanical energy, or both, to the combination of thermoplastic polyurethane, ethylene vinyl alcohol copolymer, and gel reducing additive to produce a blend; and
 - producing a sheet from the blend,

wherein the hydroxyl-functional copolymer comprises a polymer having 10 mole percent or more of repeating units of structure



wherein n is 0 or 1, R1 and R2 are independently hydrogen, methyl, or ethyl, and R3 is hydrogen or C₁₋₃ alkyl, and

wherein the gel reducing additive has a molecular weight lower than that of the hydroxyl-functional copolymer and is selected from the group consisting of compounds with at least one hydroxyl group, compounds with at least one primary amino group, compounds with at least one secondary amino group, compounds with at least one carboxyl group, and compounds with at least one carboxylic anhydride group.

12. A method according to claim 11, wherein the hydroxyl functional copolymer comprises an ethylene vinyl alcohol copolymer.

13. A method according to claim 11, wherein the gel reducing additive comprises a polyester polyol.

14. A method according to claim 11, wherein the gel reducing additive comprises a polyether polyol.

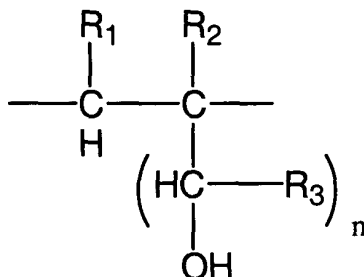
15. A method according to claim 11, wherein the molecular weight of the gel reducing additive is equal to or less than 2000.

16. A method according to claim 11, wherein the molecular weight of the gel reducing additive is equal to or less than 200.

17. A method according to claim 11, wherein the gel reducing additive comprises a compound having two or more hydroxyl groups.
18. A method according to claim 11, wherein the gel reducing additive comprises a compound with two or more amino groups.
19. A method according to claim 11, wherein the gel reducing additive is selected from the group consisting of ethylene glycol, diethylene glycol, glycerol, trimethylolpropane, ditrimethylolpropane, pentaerythritol, ethylenediamine, diethylenetriamine, triethylenetetramine, polyethylene glycol of molecular weight less than or equal to 400, propylene glycol, and dipropylene glycol.
20. A method according to claim 11, wherein the gel reducing additive comprises glycerol.
21. A method according to claim 11, wherein the producing step comprises extruding the blend.
22. A method according to claim 11, wherein the thermoplastic polyurethane comprises a polyester based thermoplastic polyurethane.
23. A method according to claim 11, wherein the hydroxyl-functional copolymer comprises a copolymer of ethylene and vinyl alcohol comprising 20-75 mole % ethylene monomers.
24. A method according to claim 11, wherein the combination of thermoplastic polyurethane, ethylene vinyl alcohol copolymer, and gel reducing additive comprises 0.05% to 5.0% by weight gel reducing additives.
25. A multilayer composite comprising a plurality of flexible layers, wherein at least one of the flexible layers is the product of forming a sheet from a blend

comprising thermoplastic polyurethane, hydroxyl-functional copolymer, and gel reducing additive,

wherein the hydroxyl-functional copolymer comprises a polymer having 10 mole percent or more of repeating units of structure



wherein n is 0 or 1, R1 and R2 are independently hydrogen, methyl, or ethyl, and R3 is hydrogen or C₁₋₃ alkyl, and

wherein the gel reducing additive has a lower molecular weight than that of the hydroxyl-functional copolymer, and contains at least one functional group that is reactive with isocyanate.

26. A multilayer composite according to claim 25, wherein the hydroxyl functional copolymer comprises an ethylene vinyl alcohol copolymer.

27. A multilayer composite according to claim 25, wherein the molecular weight of the gel reducing additive is equal to or less than 2000.

28. A multilayer composite according to claim 25, wherein the molecular weight of the gel reducing additive is equal to or less than 300.

29. A multilayer composite according to claim 25, wherein the molecular weight of the gel reducing additive is equal to or less than 200.

30. A multilayer composite according to claim 25, wherein the gel reducing additive is selected from the group consisting of ethylene glycol, diethylene glycol, glycerol, trimethylolpropane, ditrimethylolpropane, pentaerythritol, ethylenediamine,

diethylenetriamine, triethylenetetramine, polyethylene glycol of molecular weight less than or equal to 400, propylene glycol, and dipropylene glycol.

31. A multilayer composite according to claim 25, wherein the gel reducing additive comprises glycerol.

32. A multilayer composite according to claim 25, comprising a layer comprising an elastomeric material.

33. A multilayer composite according to claim 32, wherein the elastomeric material is selected from the group consisting of thermoplastic polyurethane, natural rubber, and synthetic rubber.

34. A multilayer composite according to claim 32, wherein the synthetic rubber is selected from the group consisting of copolymers and homopolymers of a monomer selected from the group consisting of butadiene and isoprene.

35. A multilayer composite according to claim 25, wherein at least one layer comprises thermoplastic polyurethane, ethylene vinyl alcohol copolymer and a gel reducing additive, and at least one other layer comprises thermoplastic polyurethane.

36. A multilayer composite according to claim 25, wherein at least one layer comprises thermoplastic polyurethane, ethylene vinyl alcohol copolymer and a gel reducing additive and at least one other layer comprises polyester.

37. A multilayer composite according to claim 25, wherein at least one layer comprises thermoplastic polyurethane, ethylene vinyl alcohol copolymer and a gel reducing additive and at least one other layer comprises polyamide.

38. A multilayer composite according to claim 25, comprising a top layer, a bottom layer, and one or more inner layers disposed between the top and bottom layers,

wherein at least one of the top and bottom layers comprises thermoplastic polyurethane, ethylene vinyl alcohol copolymer, and a gel reducing additive, and the inner layers comprise at least one gas barrier layer comprising ethylene vinyl alcohol copolymer.

39. A multilayer composite according to claim 38, wherein the inner layers further comprise one or more layers of thermoplastic polyurethane.

40. A multilayer composite according to claim 38, wherein the inner layers comprise layers of ethylene vinyl alcohol copolymer alternating with layers of thermoplastic polyurethane.

41. A multilayer composite according to claim 40, comprising more than 10 inner layers.

42. A membrane for holding an inflationary gas, comprising a multilayer composite, wherein the composite comprises at least one flexible layer comprising a blend of thermoplastic polyurethane, ethylene vinyl alcohol copolymer, and a gel reducing additive, wherein the gel reducing additive is selected from the group consisting of compounds with at least one hydroxyl group, compounds with at least one primary amino group, compounds with at least one secondary amino group, compounds with at least one carboxyl group, and compounds with at least one carboxylic anhydride group.

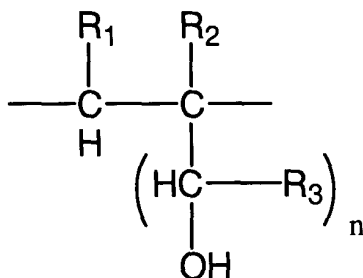
43. A membrane according to claim 42, wherein the composite further comprises at least one layer of ethylene vinyl alcohol copolymer and at least one layer of thermoplastic polyurethane.

44. A membrane according to claim 43, wherein the composite comprises outer layers of thermoplastic polyurethane, ethyl vinyl alcohol copolymer, and the gel reducing additive, and the inner layers comprise alternating layers of ethylene vinyl alcohol and thermoplastic polyurethane.

45. A membrane according to claim 42, comprising 10 or more inner layers.
46. A membrane according to claim 42, comprising 30 or more inner layers.
47. A membrane according to claim 42, wherein the molecular weight of the gel reducing additive is less than or equal to 2000.
48. A membrane according to claim 42, wherein the molecular weight of the gel reducing additive is less than or equal to 200.
49. A membrane according to claim 42, wherein the gel reducing additive comprises a compound having two or more hydroxyl groups.
50. A membrane according to claim 42, wherein the gel reducing additive comprises a compound with two or more amino groups.
51. A membrane according to claim 44, wherein the gel reducing additive is selected from the group consisting of ethylene glycol, diethylene glycol, glycerol, trimethylolpropane, ditrimethylolpropane, pentaerythritol, ethylenediamine, diethylenetriamine, triethylenetetramine, polyethylene glycol of molecular weight is less than or equal to 400, propylene glycol, and dipropylene glycol.
52. A membrane according to claim 44, wherein the gel reducing additive comprises glycerol.
53. A bladder comprising a membrane according to claim 46.

54. A shoe, comprising an upper and a sole, wherein the sole comprises one or more inflatable membranes for containing an inflationary gas, wherein at least one of the membranes comprises a multilayer composite, wherein the composite comprises at least one flexible layer comprising a blend of thermoplastic polyurethane, hydroxyl functional copolymer, and a gel reducing additive,

wherein the hydroxyl-functional copolymer comprises a polymer having 10 mole percent or more of repeating units of structure



wherein n is 0 or 1, R1 and R2 are independently hydrogen, methyl, or ethyl, and R3 is hydrogen or C₁₋₃ alkyl, and

wherein the gel reducing additive is selected from the group consisting of compounds with at least one hydroxyl group, compounds with at least one primary amino group, compounds with at least one secondary amino group, compounds with at least one carboxyl group, and compounds with at least one carboxylic anhydride group.

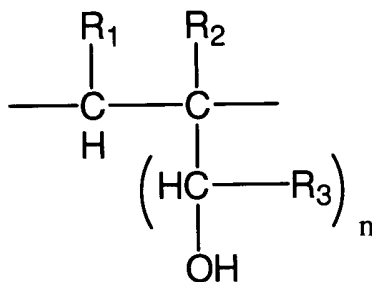
55. A shoe according to claim 54, wherein the hydroxyl functional copolymer comprises a copolymer of ethylene and vinyl alcohol.

56. A shoe according to claim 54, wherein the composite further comprises at least one layer of ethylene vinyl alcohol copolymer and at least one layer of thermoplastic polyurethane.

57. A shoe according to claim 54, wherein the composite comprises outer layers made of a blend of thermoplastic polyurethane, ethyl vinyl alcohol copolymer, and gel reducing additive, and the inner layers comprise alternating layers of ethylene vinyl alcohol copolymer and thermoplastic polyurethane.

58. A shoe according to claim 54, comprising 10 or more inner layers.
59. A shoe according to claim 54, comprising 30 or more inner layers.
60. A shoe according to claim 55, wherein the molecular weight of the gel reducing additive is less than or equal to 2000.
61. A shoe according to claim 55, wherein the molecular weight of the gel reducing additive is less than or equal to 200.
62. A shoe according to claim 55, wherein the gel reducing additive comprises a compound having two or more hydroxyl groups.
63. A shoe according to claim 55, wherein the gel reducing additive comprises a compound with two or more amino groups.
64. A shoe according to claim 55, wherein the gel reducing additive is selected from the group consisting of ethylene glycol, diethylene glycol, glycerol, trimethylolpropane, ditrimethylolpropane, pentaerythritol, ethylenediamine, diethylenetriamine, triethylenetetramine, polyethylene glycol of molecular weight is less than or equal to 400, propylene glycol, and dipropylene glycol.

65. A polymer composition with decreased gel forming tendency when blended with polymers containing urethane linkages, the composition comprising:
 a gel reducing additive; and
 a polymer having 10 or more mole % of a repeating units of formula



wherein R₁ and R₂ are independently hydrogen, methyl, or ethyl, and R₃ is hydrogen or C₁₋₃ alkyl;

wherein the gel reducing additive has a lower molecular weight than that of the hydroxyl-functional copolymer, and contains at least one functional group that is reactive with isocyanate.

66. A composition according to claim 65, wherein the gel reducing additive is selected from the group consisting of compounds with at least one hydroxyl group, compounds with at least one primary amino group, compounds with at least one secondary amino group, compounds with at least one carboxyl group, and compounds with at least one carboxylic anhydride group.

67. A composition according to claim 66, wherein the gel reducing additive comprises a polyester polyol.

68. A composition according to claim 66, wherein the gel reducing additive comprises a polyether polyol.

69. A composition according to claim 66, wherein the gel reducing additive has a molecular weight of 2000 or less.

70. A composition according to claim 66, wherein the gel reducing additive has molecular weight of 200 or less.

71. A composition according to claim 66, wherein the polymer has 30 or more mole % of the repeating units.

72. A composition according to claim 66, wherein the polymer comprises a copolymer of ethylene and vinyl alcohol.

73. A method for producing a polymer blend with decreased gel content, comprising combining a urethane containing polymer and a composition according to claim 65.